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The Ohio State University Bulletin

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WESTERN INSPECTION TRIP FOR CHEMICAL ENGINEERS

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MAY 1-6, 1922

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THE OHIO STATE UNIVERSITY

The Ohio State University, located in Columbus, is a part of the public educational facilities maintained by the State. It comprises eleven colleges and a graduate school:

The College of Agriculture,
The College of Arts, Philosophy, and Science,
The College of Commerce and Journalism,
The College of Dentistry,
The College of Education,
The College of Engineering,
The College of Homeopathic Medicine,
The College of Law,
The College of Medicine,
The College of Pharmacy,
The College of Veterinary Medicine,
The Graduate School.

This bulletin is devoted exclusively to the itinerary of the Western Inspection Trip for Chemical Engineering students, required of all third and fourth-year students in this curriculum, being Chemistry Course 181.

OBJECT. These trips are intended to give to the chemical engineerng student and advanced student in Industrial Chemistry some practical knowledge of the magnitude of modern chemical industrial operations from a selected variety of examples, and an opportunity to get a view of the different branches of the professions of chemical engineering and industrial chemistry in proper perspective, and to receive training in observation. They are strictly educational and are required for graduation in Chemical Engineering.

WESTERN INSPECTION TRIP
MAY 1-6, 1922

IN ALL MATTERS OF DOUBT IN REGARD TO ITINERARY, CONSULT DIRECTOR IN CHARGE.

GENERAL INSTRUCTIONS. On account of the strenuous nature of the schedule, each man should conserve his strength as much as possible and get plenty of rest and sleep each night. This is not a pleasure trip, but a serious effort to obtain information at first hand of the technical application of chemistry in manufacturing enterprises.

Travel light, with small handbag, because of tedious carry at different points. Include a light or medium-weight overcoat because of weather variability in lake cities. Be prepared for shift in underclothing for the same reason. Wear well-fitting shoes which you have found are easy on your feet under walking conditions. Carry ample stocking changes. Start the trip in prime physical condition. Beware of overeating on trip. The dangers of change from boarding fare can thus be avoided. Keep the whole alimentary tract functioning regularly.

BREAKFAST. Due to arrangements allowing but 30 minutes for breakfast, it is necessary that no one order a course dinner, because he will not have time to eat it. Confine breakfast to sandwiches (roast-beef, cheese, ham, sausage), or cereals (oatmeal, shredded wheat, corn flakes, grape-nuts), fruits (grapefruit, oranges), and coffee, milk or cocoa, with rolls.

Promptness in all appointments is absolutely essential because the companies have been notified that visits will be made at certain specified times. Members not staying at the hotels must adjust their schedules so as to be at the appointed stations or plants exactly on time. Any lateness causes extra strain on directors of trip. If you should be late, stay out of plant so as not to annoy its officers.

Each man must pay his own hotel bill before checking out. He is responsible for his own luggage. Accidental omission of paying for hotel and meals look bad for institution and hurts its good name.

A roll of attendance will be kept for each item of the itinery.

No one is excused from any portion of trip or from a conference unless previous arrangement has been made.

On arrival at each plant squads will be formed and these divisions must be strictly maintained throughout the round of the plant. DON'T STRAGGLE BEHIND; it causes annoyance to the guides and other employes. Ask all the questions you want to. Notes should be taken, whenever possible and when not forbidden by desire of company. Such desire if made known must be respected. These are to be written up more fully in the evenings. Photographs must not be taken at any plant. Cameras should be kept in pockets or left at plant office.

Keep out of way of workmen. Do not obstruct operations. Annoyance of girl employes will not be tolerated. Influence on succeeding trips would be serious. Gentlemanly conduct is always necessary. Skylarking may be dangerous to individuals and is always annoying to plant officers. It is forbidden at all times. Card-playing is not a mark of distinction. Quite the reverse. Its omission is requested, particularly on public conveyances.

INFRACTIONS OF THESE INSTRUCTIONS WILL RESULT IN DISMISSAL FROM THE TRIP.

REPORTS. Written reports on standard 11-inch by 8½-inch note paper are required from everyone taking the Inspection Trip. Reports must be brief, and be specific additions to your general knowledge, and quantitative where possible. For the purpose of report writing, the party will be divided into ten groups or squads, consisting of: 1st, No. 1-7; 2nd, No. 8-14; 3rd, No. 15-21; 4th, No. 22-28; 5th, No. 29-35; 6th, No. 36-42; 7th, No. 43-49; 8th, No. 50-56; 9th, No. 57-62; 10th, No. 63-68.

Each squad will be in charge of a squad leader. Only seniors will serve as squad leaders with rotation in leadership as follows: The first senior listed in the squad on the first day, the second on the second day, etc., until the last senior has served as leader when the leadership again reverts to No. 1 senior in the squad.

The leader is responsible at all times for keeping his squad intact. It shall be the duty of squads to keep in close touch with their squad leaders **at all times.** Squad leaders shall keep squads as near the directors and guides as possible, and prevent straggling. Leaders shall report to trip directors **immediately after each visit** and before the next move, and assign to the

different members of their squads different parts of topics upon which they are reporting as he sees fit. **It is to be noted that every member of a squad must cover each assigned topic fully in his written report.** Each squad or group will report from the following points of view at the first plant reported upon:

Points of View of Plant Reports.

1. **Market Demand: Finished Products**; specifications; output. Raw Materials; specifications; consumption.

2. **Chemistry and Process**: Simplified Reactions; quantities involved; flow sheet.

3. **Engineering Operations**: Capacities; Performance; Material and power consumption; flow sheet.

4. **Machines**: Types in use; name plate references; list of special machinery; capacities.

5. **Units Operated**: Power per unit; reason for subdivision into units.

6. **Distinctive Features**: Reasons for same; performance.

7. **Plant Control**: Points in the process where tests are made. Methods of testing and special laboratory testing devices; checking operations.

8. **Organization and personnel.**

9. **Suggestions** of places in the plant where Duriron or Vitreosil could be advantageously used.

10. **Plant and laboratory equipment** which could be used or modified for use in the future laboratory of Industrial Chemistry and Chemical Engineering in the Ohio State University, pointing out what will be illustrated or taught thereby.

Each succeeding time you report, select the next point of view numerically from that used in previous report. For example, A. uses point of view (1) in his first report. The next plant he reports upon he will use point of view (2). When he uses topic (10) he next moves to (1). His whole group or squad, of course, makes simultaneous and identical changes throughout the trips.

Reports due Tuesday, May 23, 7:00 P. M.

Squads for Assignment.

I

1. Arthur, Edwin P.
2. Baker, Warren J.
3. Acosta, Angel
4. Barden, Clayton
5. Bland, George
6. Butts, Durian
7. Carrel, Harry

II

8. Bell, Rodney
9. Blumenthal, Benjamin
10. Cleveland, Dean
11. Davidson, Glenn
12. Donham, Ralph
13. Ferguson, Ralph
14. Fisher, Elmer J.

III

15. Cooke, Horace B.
16. Corwin, Albert G.
17. Cover, Klahr
18. Foster, Robert
19. Goff, James
20. Gorman, Joseph
21. Hamilton, Arthur

IV

22. Davies, Harold
23. Dixon, Tod
24. Eagle, Curtis
25. Harrison, William
26. Hendrickson, Edgar
27. Holmstrom, Paul
28. Kirkpatrick, Walter

V

29. Fischer, Ferdinad
30. Gotter, Robert J.
31. Heald, Robert
32. Lonsway, William
33. Lyon, George
34. Maple, Lawrence
35. May, Paul

VI

36. Hines, Paul R.
37. Kay, Webster
38. Kintner, Robert C.
39. Michael, Alton
40. Miller, Harold
41. Moon, Howard
42. Mutersbaugh, Gordon

VII

43. Kissling, Lehr
44. Klaiber, Walter
45. Kohr, Roland
46. Norris, Wayne
47. Peters, Alvin
48. Prinz, Edwin N.
49. Rebuck, Ralph

VIII

50. Miller, Wesley
51. Morris, Victor
52. Osborne, Harold
53. Roberts, L. A.
54. Robinson, G. Dudley
55. Ruffner, Arthur
56. Shenker, Earl

IX

57. Ritchie, Clarence
58. Staueble, Irwin C.
59. Schwenzen, Albert
60. Sims, William
61. Speer, Paul
62. Turnbull, Edward

X

63. Wilson, James
64. Wing, Wallace
65. Volk, Frank
66. Whirl, William
67. Wolfe, Richard
68. Wright, Theron

ASSIGNMENTS FOR READING: To be read before taking trip in order to assist students in clarifying their minds on various industries to be visited.

For Juniors: Hart's "Textbook of Chemical Engineering."

For Seniors: References are to "Rogers' Manual of Industrial Chemistry" if not otherwise mentioned.

Miami Paper Co. Electrolytic Chlorine.....Page 258- 271
Paper Making..... 1033-1046
West Carrollton Paper Co. H_2SO_4 Concentration..... 173- 180
American Oak Leather Co. Tanning..... 1092-1113
Eagle-Picher Lead Co. White Lead, Red Lead..... 360- 367
Procter & Gamble Co. Soaps..... 723- 738
Glycerine 739- 746
American Oil Treating and Hardening Co. Hydrogenation 701- 707
Chatfield Manufacturing Co. Coal-tar By-products.. 554- 587
Sherwin-Williams Co. Varnish..... 851- 859
Acetic Acid..... 648- 649
Insecticides, Pigments, Dyes..... 392- 401
Grasselli Chemical Co. Sulfuric Acid..... 124- 190
Hydrochloric Acid..... 215- 218
Nitric Acid 191- 207
Ammonia 221- 223
Corn Products Refining Co. Starch, Dextrin and Glucose 898- 914
Standard Oil Co. Petroleum Refining, J. Ind. and Eng. Chemistry, Vol. 6..... 42- 43
Illinois Steel Co. By-product Coke Process, J. Ind. and Eng. Chem., Vol. 6..... 55- 56
Detroit Sulfite Pulp and Paper Co.,Sulphite Pulp and Paper Making..... 1033-1046
Solvay Soda Process Co. Solvay Soda..... 250- 251
Acme Lead Work. Pigments, Red Lead..... 392- 401
Parke, Davis Co. Hydrogen Peroxide..... 231
Libbey Glass Co.
Ford Plate Glass Works } Glass..... 336- 359

WESTERN INSPECTION TRIP FOR CHEMICAL ENGINEERS

The Ohio State University, 1922

MONDAY, MAY 1

(NOTE: Care must be taken to note the kind of time mentioned herein, whether Central or Eastern.)

7:30 a. m. (Columbus Time).

6:30 a. m. (Central Time)—Arrive at Union Station, Columbus, Ohio.

6:35 a. m. (C. T.)—Board Big Four R. R. Train No. 41 for Dayton, Ohio. Party ticket. Carry your baggage. File by badge number.

6:50 a. m. (C. T.)—Leave Columbus.

8:35 a. m. (C. T.) } Arrive Dayton, Ohio, Findlay St. Carry
9:35 a. m. (E. T.) } baggage

Walk to Duriron Company Plant and deposit baggage.

9:40 a. m. (E. T.)—Walk three blocks east along Big Four Tracks.

9:45 a. m. (E. T.)—Arrive at plants of

ECONOMY SOAP PRODUCTS COMPANY

Twitchellizing cotton-seed foots. Glycerine recovery. Fatty acid distillation.

10:10 a. m. (E. T.)—Leave Plant. Walk back three blocks.

10:15 a. m. (E. T.)—Arrive at Plant of

THE DURIRON COMPANY

Manufacture of acid-proof castings. "Duriron," the product of this plant, is used as the material in which acid concentration can be conducted by evaporation and for many other chemical engineering purposes. This product is an epoch-making alloy in this field. Note the special carborundum machining technique. It is too hard to machine by ordinary methods.

11:15 a. m. (E. T.)—Leave Duriron Plant. Carry baggage across Erie R. R. tracks and two blocks south on Findlay St. to Springfield St.

11:30 a. m. (E. T.) Sharp—Board special car, (squad conferences), the Dayton and Cincinnati Traction Lines, to plant of the National Cash Register Co.

12:15 p. m. (E. T.)—Leave baggage in car. Arrive at Plant of

NATIONAL CASH REGISTER COMPANY

Lunch at Company Restaurant. Luncheon at courtesy of the National Cash Register Co. Pay for what you order.

12:45 p. m. (E. T.)—Visit plant. Note the layout of buildings, their internal arrangement and lighting; the provisions for employees' welfare and systematic arrangement and distribution of work. Delicate and complicated machinery with many operations accomplished in one cycle. Probably largest and most thorough electro-plating plant in country. Cleaning metals for electrolysis. Lacquering. Manufacture of ink, etc. Thorough control of supplies by chemical and engineering testing laboratories.

1:30 p. m. (E. T.)—Leave the National Cash Register Company.

Take special C. and D. car to Moraine City. (Squad conferences.)

1:40 p. m. (E. T.)—Arrive at Research Laboratories of the

GENERAL MOTORS COMPANY

2:20 p. m. (E. T.)—Leave General Motors Laboratories, take special car to West Carrollton.

2:30 p. m. (E. T.)—Arrive at Plant of

MIAMI PAPER COMPANY

Electrolytic chlorine and caustic plant. Allen-Moore cells. Pulp bleaching. Paper sizing and manufacture.

3:10 p. m. (E. T.)—Walk to

WEST CARROLLTON PAPER COMPANY

Parchmentizing; waxing sulfuric acid concentration.

3:30 p. m. (E. T.)—Walk to West Carrollton Stop, Cincinnati & Dayton Traction.

Take special car to Hamilton, Ohio. (Squad conferences.)

4:30 p. m. (E. T.)—Arrive at Plant of

CHAMPION COATED PAPER COMPANY

Paper coating. Excellent power plant.

5:45 p. m. (E. T.)—Leave the paper company plant.

Special car on C. & D. Traction. General conference on car.

6:35 p. m. (E. T.)—Arrive Spring Grove and Linden Ave., Cincinnati. Take baggage, transfer to Clark St. (city) car.

Get off at Fountain Square and walk south on Vine St. one square.

HOTEL SINTON

Fourth and Vine Sts. Register list will be presented to hotel clerk. Sign up; get room assignment. Wash up and go out to supper. There are a number of restaurants in the neighborhood such as French-Bauer Bros., south side of Fifth Street opposite Postoffice, and Thompson Restaurant across the street from hotel. Evening open.

TUESDAY, MAY 2

6:30 a. m. (E. T.)—Breakfast out.

7:20 a. m. (E. T.)—Report in Hotel Lobby.

7:35 a. m. (E. T.)—Take Clark Street car at Fifth, going north on Vine to Kenner Street. Walk three squares west.

8:00 a. m. (E. T.)—Visit the tanneries of

THE AMERICAN OAK LEATHER COMPANY

Treatment and manufacture of sole, patent and enameled leather. Dyeing of leather.

9:20 a. m. (E. T.)—Walk back to Freeman and Kenner Streets. Return by Clark Street car going south to Vine and Fifth.

9:45 a. m. (E. T.)—Walk to Vine and Fourth. Take "East End" car going to Pearl and Pike Streets. Group conferences.

10:00 a. m. (E. T.)—Walk south one square to Front, then left one-half square to 614 East Front Street to

THE AMERICAN COPPER AND BRASS WORKS

Coppersmiths. Column apparatus for fractional distillation. Multi-tubular condensers. Copper stills. Shapes and forms for variety of chemical work.

10:25 a. m. (E. T.)—Walk back to Pearl and Pike Streets. Walk west to Broadway and Fifth.

10:35 a. m. (E. T.)—Take "Norwood" or "Eden-Zoo" car on Broadway north to Hunt Street.

10:45 a. m. (E. T.)—Visit

EAGLE-PICHER LEAD COMPANY

White lead; corrosion by the Old Dutch Process; Litharge, orange mineral, red lead, pig lead, plumbers' lead goods; making lead pipes and bends.

11:35 a. m. (E. T.)—Leave the lead works. Walk two blocks to Main Street in front of Court House. Take Lockland car north to Ivorydale, Ohio. Group conferences.

12:20 p. m. (E. T.)—Arrive Ross Avenue. Walk to Plant of

THE PROCTER & GAMBLE COMPANY

12:30 p. m. (E. T.)—Luncheon at the plant restaurant. Courtesy of Procter & Gamble Co. Pay for what you order.

1:00 p. m. (E. T.)—Visit Procter & Gamble's plant. Cotton seed oil refining. Glycerine, fatty acid and candle manufacture. Hardened fats and oils, soap manufacture. Hydrogen generation. Caustic soda production.

2:10 p. m. (E. T.)—Leave Procter & Gamble. Walk around to rear.

2:20 p. m.—Arrive at Plant of

AMERICAN OIL TREATING & HARDENING COMPANY

Hardening of oils by hydrogenation.

3:10 p. m. (E. T.)—Leave plant. Walk to car line.

3:30 p. m. (E. T.)—Take car to Carthage, Ohio.

3:40 p. m. (E. T.)—Arrive at Plant of

THE CHATFIELD MANUFACTURING COMPANY

Coal-tar and asphalt products. Manufacturers of naphthalene products, dips, pitches, tar oils, and black enamel paints.

4:35 p. m. (E. T.)—Take Cincinnati car back to Fourth and Vine Street.

5:30 p. m. (E. T.)—Arrive at Hotel Sinton. General conference at once.

6:00 p. m. (E. T.)—Clean up and lunch at any restaurant. Return to Hotel.

6:45 p. m. (E. T.)—Collect your baggage. Pay your hotel bill.

Evening open until 9:45 p. m.

9:45 p. m. (E. T.)—Assemble in Hotel Lobby.

10:00 p. m. (E. T.)—Walk four blocks west and one south to Third and Central Ave. to Union Station. Board Big Four train No. 31. Special sleepers. Party ticket.

10:45 p. m. (E. T.)
9:45 p. m. (C. T.) } Leave Cincinnati.

10:00 p. m. (C. T.)
11:00 p. m. (E. T.) } Lights out.

WEDNESDAY, MAY 3

5:30 a. m. (C. T.)—Dress and wash. Prepare to detrain promptly at Kensington.

6:30 a. m. (C. T.) } Arrive Kensington, Illinois. Leave train
7:30 a. m. (E. T.) } AT ONCE. Do not fee the porter; provision will be made for him. Leave baggage in sleeping car at a place indicated for delivery to Chicago hotel. Representative of the Big Four Railroad will meet us here to take care of party. Walk to Busy Bee restaurant, 11459 Cottage Grove Avenue. Breakfast.

8:10 a. m. (E. T.)—Walk to

SHERWIN-WILLIAMS COMPANY

Colors, dyes, intermediates, pigments, paints, insecticides, varnishes, white lead by Dutch Process, acetic acid, arsenic acid.

9:45 a. m. (E. T.)—Leave Sherwin-Williams Plant. Walk to Kensington Interurban Station. Buy ticket, 61 cents.

9:00 a. m. (C. T.) }
10:00 a. m. (E. T.) } Take Chicago, Lakeshore and South Bend R. R. Co. Traction line, Train No. 115, to Gary, Ind. Squad conferences.

9:45 a. m. (C. T.) }
10:45 a. m. (E. T.) } Arrive Gary, Indiana. Walk to office of Indiana Steel Company.

9:50 a. m. (C. T.) }
10:50 a. m. (E. T.) } Visit Gary Works of

THE INDIANA STEEL COMPANY

Kopper's by-product coke ovens; 42 open hearths; 8 400-ton blast furnaces, power gas utilization; ammonium sulfate; benzol recovery, scrubbing system.

12:35 a. m. (E. T.)—Leave works. Walk south on Broadway to restaurant and lunch at Commercial or Broadway Restaurants. Be brief.

1:10 p. m. (E. T.)—Walk north to South Shore Interurban Line (Chicago, Lake Shore and South Bend R. R.). Buy ticket, 21 cents. Board Train No. 22 for Calumet, Indiana.

1:22 a. m. (E. T.) }
12:22 p. m. (C. T.) } Train leaves Gary for Calumet. Squad conferences.

12:35 p. m. (C. T.) } Arrive Calumet. Walk three-fourths
1:35 p. m. (E. T.) } mile south via Kennedy Avenue to plant of Grasselli Chemical Company.

1:35 p. m. (E. T.)—12:35 p. m. (C. T.).

2:00 p. m. (E. T.)—Visit Plant of

THE GRASSELLI CHEMICAL COMPANY

Manufacture of crude and C. P. sulfuric, nitric, hydrochloric and acetic acids; salt cake, Glauber's salt, sodium silicate, water glass, insecticides, etc.

3:00 p. m. (E. T.)—Walk across tracks to

UNITED STATES METALS REFINING COMPANY

Recovery of silver by Betts' process. (Electrolytic Lead.)

3:30 p. m. (E. T.)—Leave plant. Walk to N. Y. Central Station. Party ticket.

2:49 p. m. (C. T.) } Board N. Y. Central R. R. Train No. 663
3:49 p. m. (E. T.) } to Whiting, Indiana. Squad conferences.
4:07 p. m. (E. T.) }
3:07 p. m. (C. T.) } Arrive at Whiting, Indiana.

4:15 p. m. (E. T.)—Visit.

STANDARD OIL COMPANY

Production and refining of petroleum products from crude oil from Kansas and Southern Illinois fields. Gasoline, burning oils, lubricating oils, paraffin, axle grease and candle manufacture. Burton Process—Gasoline from fuel oil.

5:45 p. m. (E. T.)—Leave Oil Works. Party ticket for Chicago. General conference at once.

6:12 p. m. (E. T.) } Leave Lake Shore Station at Whiting via
5:12 p. m. (C. T.) } New York Central R. R. Train No. 691.

5:55 p. m. (C. T.)—Arrive LaSalle Street Station, Chicago, Illinois.

Walk across street to

FORT DEABORN HOTEL

South East Corner Van Buren and LaSalle. Register. Dine at your convenience at hotel or restaurant. Evening open.

THURSDAY, MAY 4

5:30 a. m. (E. T.)—Call for rising.

6:00 a. m. (E. T.)—Breakfast.

6:30 a. m. (E. T.)—Leave hotel. Walk to LaSalle Street Elevated Station on Loop to Elevated trains. Take South Side Elevated, Englewood branch to Loomis.

7:12 a. m. (E. T.)—Transfer to Sixty-third Street car west. Get transfers to Argo car.

8:05 a. m. (E. T.)—Transfer to Argo car to Argo, Illinois.

8:15 a. m. (E. T.)—Arrive at Argo and visit Plant of

CORN PRODUCTS REFINING COMPANY

Note excellent plan and construction of plant. An illustration of a thoroughly efficient chemical industry. Starch, glucose and various corn products. The enormous size of plant is desirable for efficient operation. The great size of this plant, however, raises question of ability of the best railroad facilities to efficiently furnish raw materials and distribute products.

9:40 a. m. (E. T.)—Leave Argo, returning to Minard Avenue, Clearing, Illinois. Squad conferences.

10:00 a. m. (E. T.)—Walk south to Sixty-sixth Street to

NATIONAL OIL TREATING COMPANY and NATIONAL OXYGEN COMPANY

Electrolytic hydrogen generators. Hydrogenation.

10:30 a. m. (E. T.)—Walk back to car line. Take Sixty-third Street car east to Ashland Avenue. Squad conferences.

Change on Ashland Avenue car to Forty-third Street.

Walk four blocks east to Stock Yards, Packers' Avenue, and then one block north.

11:30 a. m. (E. T.)—Visit

SWIFT & COMPANY

Meat packing. Soap manufacture. Utilization animal products. Glue. Fertilizer. Glycerine. Fatty acids. Hydrogenation.

12:45 p. m. (E. T.)—Lunch. Swift restaurant. Pay for what you order.

1:15 p. m. (E. T.)—Walk to Stock Yard Loop.

1:20 p. m. (E. T.)—Take elevated train to Indiana Avenue. Squad conferences. Change to express for down-town loop.

2:00 p. m. (E. T.)—Arrive at Clark Street Station. North

side of loop. Walk north across the Chicago River to North Clark Street and Kinzie Avenue.

2:15 p. m. (E. T.)—Visit the cold storage plant and warehouse of the

BOOTH FISHERIES COMPANY

3:00 p. m. (E. T.)—Return south across Chicago River to Clark and Lake Streets Station of the Metropolitan Elevated.

3:15 p. m. (E. T.)—Take Garfield Park train on inside of Loop going west. Squad conferences.

4:00 p. m. (E. T.)—Arrive St. Louis Station. Walk south to Homan Avenue. Visit Plant of

SEARS, ROEBUCK & COMPANY

Visit control laboratory in tower of main building, also wall paper manufacture.

5:15 p. m. (E. T.)—Walk north to St. Louis Station. Take Elevated train east to the Loop. Squad conferences. Leave train at LaSalle Street Station. Descend to street, walk to the Fort Dearborn Hotel. Wash, and dine.

Evening open until 9:00 p. m. (C. T.). Be promptly in hotel lobby at this time. Pay hotel bill.

10:00 p. m. (E. T.)—Secure baggage. Take South Side Elevated train to Twelfth Street Station. Walk two blocks east and north to Michigan Central R. R. Depot. Twelfth Street and Lake Front.

9:20 p. m. (C. T.)—10:20 p. m. (E. T.)—Roll call. General conference.

9:30 p. m. (C. T.) } Board Train No. 6, Michigan Central R.
10:30 p. m. (E. T.) } R. Party ticket. Special sleepers.

10:00 p. m. (C. T.)—Leave for Detroit.

10:30 p. m. (C. T.)—Lights out.

FRIDAY, MAY 5

6:45 a. m. (E. T.)—First call for dressing.

7:00 a. m. (E. T.)—Dress and wash in relays. Use both washrooms. Do not fee porter. Provision will be made for him.

7:45 a. m. (E. T.)—Arrive Michigan Central Station, Detroit, Michigan. Leave train at once. Check baggage at station for Toledo.

7:50 a. m. (E. T.)—(7:50 a. m. E. T.)—Breakfast at Depot

Lunch Counter. Imperative that the group remains together here.

8:20 a. m. (E. T.)—Board street car to connect with Fort-South Dearborn or West Jefferson Avenue car going west on Fort Street.

8:45 a. m. (E. T.)—Get off at 2607 West Jefferson Avenue, the gate of

THE DETROIT SULFITE PULP AND PAPER COMPANY

Sulphite pulp. Cylinder—Fourdrinier and M. G. Products.

9:45 a. m. (E. T.)—Take Fort-South Dearborn car going back towards city. Squad conferences.

10:00 a. m. (E. T.)—Get off at Springwell and West Jefferson Avenues. Walk one block east.

Arrive at and visit

SOLVAY SODA COMPANY

Ammonia soda process; caustic soda; Solvay by-product ovens; CO_2 production; ammonia recovery. Most highly developed chemical engineering industry.

11:15 a m. (E. T.)—Walk back to Springwell Street and West Jefferson Avenue. Take a Fort (West Jefferson) or Fort (Delrey) car into city. Squad conferences.

11:25 a. m. (E. T.)—Get off at Junction Avenue, walk north from the river to the office (just north of the Wabash Railroad) of

THE DETROIT CHEMICAL WORKS

Sulfuric acid; nitric acid.

12:15 p. m. (E. T.)—Leave plant; return to Junction Avenue and Fort Street and take a Fort (West Jefferson), Fort (Delrey) or any city-bound car and get transfers to East Jefferson. Get off at Fort and Griswold. Squad conferences.

12:30 p. m. (E. T.)—Lunch in nearby restaurant.

1:00 p. m. (E. T.)—Take an East Jefferson car on Griswold Street from the corner of Fort and get off at Joseph Campau; walk towards the river (south) three blocks to the visitors' entrance of Parke-Davis & Co. on Atwater Street.

1:15 p. m. (E. T.)—Visit Plant of

PARKE-DAVIS & COMPANY

Manufacturing pharmacists and pharmaceutical chemists.

2:00 p. m. (E. T.)—Take a Chene Street car at Parke-Davis on Joseph Campau to about No. 1820 Joseph Campau. Squad conferences. Walk west along Grand Trunk R. R. to the

2:45 p. m. (E. T.)—

ACME WHITE LEAD AND COLOR WORKS

Colors; varnish; red lead; mechanical reverbatories.

3:15 p. m. (E. T.)—Walk west three blocks to

AIR REDUCTION SALES COMPANY

Hartwick Street

Liquid air machinery.

3:45 p. m. (E. T.)—Return on Smith street and take Clay Street Plug line to Oakland, then take Fourteenth and Victor car going north to Woodland. Squad conferences. Change to Ford-Victor car for the Ford Plant.

4:15 p. m. (E. T.)—Visit the Plant of

THE FORD MOTOR WORKS

Case hardening. Heat treatment of steel. Note special labor-saving tools, systematic shop arrangement and routing of works.

5:00 p. m. (E. T.)—Leave Ford Works. Take eastbound "Woodward Avenue" car on the Woodward Avenue side, marked "Michigan Central Depot." Squad conferences.

5:45 p. m. (E. T.)—Arrive Michigan Central Depot. Sandwich and milk luncheon at depot lunch counter.

6:05 p. m. (E. T.)—5:05 p. m. C. T.—Board Train No. 5, Michigan Central R. R. General conference at once.

5:12 p. m. (C. T.)—Train leaves for Toledo, Ohio. Conference on train.

7:10 p. m. (C. T.)—Arrive Union Station, Toledo, Ohio. Board Cherry or Oak Street cars. Get off at Madison Avenue.

7:30 p. m. (C. T.)—Walk to

BOODY HOUSE

St. Clair and Madison Streets.

7:40 p. m. (C. T.)—8:40 p. m. E. T.—Register at hotel; get room assignments.

SATURDAY, MAY 6

6:00 a. m. (E. T.)—Call for breakfast.

7:30 a. m. (E. T.)—Take Oak Street car to Rossford.

8:00 a. m. (E. T.)—Visit Plant of

EDWARD FORD PLATE GLASS COMPANY

Glass oven rolling and polishing of plate glass.

9:15 a. m. (E. T.)—Return by Oak Street to Summit and Cherry Streets. Transfer to Summit Street car toward Bayview Park.

10:00 a. m. (E. T.)—Get off at Ash Street; walk to left two blocks. Visit Plant of

THE LIBBEY CUT GLASS COMPANY

Manufacturers of cut glass, casting machines, lamp bulbs, chemical glassware, glass tubing; chemical tinting of glass.

11:30 a. m. (E. T.)—Return to Summit Street and take car south to hotel. Dine at any neighboring restaurant.

12:30 p. m. (E. T.)—Leave hotel. Take East Toledo car to south end of Broadway (across Cherry Street bridge).

Walk two blocks south to Hanson Street and east one block to Industrial Street.

1:00 p. m. (E. T.)—Visit Plant of

THE TOLEDO SEED AND OIL COMPANY

Vegetable Oil recovery from seed.

2:15 p. m. (E. T.)—Walk back to South Broadway car. Ride north to Front Street. Transfer northeast to 2400 Front Street.

2:45 p. m. (E. T.)—Visit Plant of

THE TOLEDO FURNACE COMPANY

By-product coke oven. Benzol recovery. Special process ammonium sulphate recovery.

4:00 p. m. (E. T.)—Street car to hotel. **Pay your bill.**

5:00 p. m. (E. T.)—Carry baggage one block east to Cherry Street. Take car marked Union Depot.

5:30 p. m. (E. T.)—4:30 p. m. (C. T.)—Board Hocking Valley R. R. Train No. 36. Special car.

4:45 p. m. (C. T.)—Leave Toledo for Columbus.

6:45 p. m. (C. T.)—Dinner, Upper Sandusky, 75 cents. Lunch

counter also. Number of dinners ordered forwarded by wire on train at Fostoria.

8:35 p. m. (C. T.)—Arrive Columbus, Union Station.

WRITTEN REPORTS DUE TUESDAY, MAY 23.

CONFERENCE REVIEW OF ENTIRE TRIP TUESDAY, May 23, 7:00 P. M., ROOM 200, CHEMISTRY BUILDING.

SUGGESTIONS FROM ANY POINT OF VIEW FOR BETTERMENT OF ANY FEATURE OF THE TRIP ARE REQUESTED.

TRIP IN CHARGE OF

DR. JAMES R. WITHROW,
Professor of Industrial Chemistry,
Assisted by MR. A. H. VILBRANDT,
And MR. H. E. FRITZ,
Special Assistants in Industrial Chemistry,
The Ohio State University.

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APPENDIX

Official Number		Sleeper Berths Cincinnati to Kensington	Chicago to Detroit
I.	1. Arthur, Edwin	Upper 6 car 1	Upper 6 car 1
	2. Baker, Warren	Lower 3 car 1	Lower 3 car 1
	3. Acosta, Angel	Upper 9 car 1	Upper 9 car 1
	4. Barden, Clayton	Upper 7 car 1	Upper 7 car 1
	5. Bland, George	Lower 7 car 1	Lower 7 car 1
	6. Botts, Durlan	Upper 10 car 1	Upper 10 car 1
	7. Carrol, Harry	Upper 4 car 2	Upper 4 car 2
II.	8. Bell, Rodney	Lower 3 car 2	Lower 3 car 2
	9. Blumenthal, Benj.	Lower 1 car 2	Lower 1 car 2
	10. Cleveland, Dean	Lower 3 car 2	Lower 3 car 2
	11. Davidson, Glenn	Lower 10 car 1	Lower 10 car 1
	12. Donham, Ralph	Upper 4 car 2	Upper 4 car 2
	13. Ferguson, Ralph	Lower 10 car 1	Lower 10 car 1
	14. Fisher, Elmer J.	Lower 9 car 1	Lower 9 car 1
III.	15. Cooke, Horace B.	Lower 2 car 2	Lower 2 car 2
	16. Corwin, Albert	Upper 2 car 1	Upper 2 car 1
	17. Cover, Klahr	Lower 5 car 1	Lower 5 car 1
	18. Foster, Robert	Upper 7 car 2	Upper 7 car 2
	19. Goff, James	Upper 5 car 1	Upper 5 car 1
	20. Gorman, Joseph	Upper 8 car 1	Upper 8 car 1
	21. Hamilton, Arthur	Lower 5 car 2	Lower 5 car 2
IV.	22. Davies, Harold	Lower 5 car 1	Lower 5 car 1
	23. Dixon, Tod	Lower 11 car 1	Lower 11 car 1
	24. Eagle, Curtis	Upper 3 car 1	Upper 3 car 1
	25. Harrison, William	Lower 7 car 2	Lower 7 car 2
	26. Hendrickson, Edgar	Lower 11 car 2	Upper 11 car 2
	27. Holstrom, Paul	Upper 1 car 2	Upper 1 car 2
	28. Kirkpatrick, Walter	Lower 9 car 2	Lower 9 car 2
V.	29. Fischer, Ferdinand	Upper 10 car 2	Lower 10 car 2
	30. Gotter, Robert J.	Lower 3 car 1	Lower 3 car 1
	31. Heald, Robert	Upper 3 car 1	Upper 3 car 1
	32. Lonsway, William	Upper 8 car 2	Upper 8 car 2
	33. Lyon, George	Upper 7 car 1	Upper 7 car 1
	34. Maple, Lawrence	Upper 2 car 2	Upper 2 car 2
	35. May, Paul	Upper 4 car 1	Upper 4 car 1

Sleeper Accommodations—Continued

Official Number		Sleeper Berths Cincinnati to Kensington	Chicago to Detroit
VI. 36.	Hines, Paul R.	Lower 1 car 1	Lower 1 car 1
37.	Kay, Webster	Lower 4 car 1	Lower 4 car 1
35.	Kintner, Robert	Lower 8 car 1	Lower 8 car 1
39.	Michael, Alton	Upper 8 car 2	Upper 8 car 2
40.	Miller, Harold	Lower 8 car 2	Lower 8 car 2
41.	Moon, Howard	Upper 5 car 1	Upper 5 car 1
42.	Mutersbaugh, Gordon	Upper 4 car 1	Upper 4 car 1
43.	Kissling, Lehr	Lower 1 car 1	Lower 1 car 1
44.	Klaiber, Walter	Lower 2 car 2	Lower 2 car 2
45.	Kohr, Roland	Lower 4 car 2	Lower 4 car 2
46.	Norris, Wayne	Upper 7 car 2	Upper 7 car 2
47.	Peters, Alvin	Lower 9 car 2	Lower 9 car 2
48.	Prinz, Edwin	Upper 3 car 2	Upper 3 car 2
49.	Rebuck, Ralph	Upper 11 car 2	Lower 11 car 2
50.	Miller, Wesley	Lower 4 car 2	Lower 4 car 2
51.	Morris, Victor	Upper 11 car 1	Upper 11 car 1
52.	Osborne, Harold	Lower 12 car 2	Lower 12 car 2
53.	Roberts, L. A.	Lower 8 car 2	Lower 8 car 2
54.	Robinson, Dudley G.	Upper 3 car 2	Upper 3 car 2
55.	Ruffner, Arthur	Lower 7 car 1	Lower 7 car 1
56.	Shenker, Earl	Lower 1 car 2	Lower 1 car 2
57.	Ritchie, Clarence	Lower 5 car 2	Lower 5 car 2
58.	Staueble, Irwin	Lower 4 car 1	Lower 4 car 1
59.	Schwenzen, Albert	Lower 2 car 1	Lower 2 car 1
60.	Sims, William	Upper 9 car 2	Upper 9 car 2
61.	Speer, Paul	Upper 7 car 2	Upper 7 car 2
62.	Turnbull, Edward	Upper 5 car 2	Upper 5 car 2
63.	Wilson, James	Upper 1 car 1	Upper 1 car 1
64.	Wing, Wallace	Lower 10 car 2	Upper 10 car 2
65.	Volk, Frank	Upper 5 car 2	Upper 5 car 2
66.	Whirl, William	Lower 9 car 1	Lower 9 car 1
67.	Wolfe, Richard	Upper 8 car 1	Upper 8 car 1
68.	Wright, Theron	Lower 2 car 1	Lower 2 car 1
	Directors		
69.	Fritz, Howard E.	Lower 6 car 1	Lower 6 car 1
70.	Vilbrandt, Albert H.	Lower 12 car 1	Lower 12 car 1
71.	Withrow, Dr. Jas. R.	Lower 6 car 2	Lower 6 car 2

EXPENSE ACCOUNT

Item		I	II
1.	Incidental fund (for buttons, baggage, tags, tips, etc.), in Dr. Withrow's care	$ 0.75	
2.	Train fare, Columbus, O., to Dayton, O.	2.51	
3.	Train fare, Dayton, O., to Cincinnati (special car)	1.58	
4.	Train fare, Cincinnati, O., to Kensington, Ill.	10.02	
5.	Train fare, Kensington, Ill., to Gary, Ind.	.61	
6.	Train fare, Gary, Ind., to Calumet, Ind.	.21	
7.	Train fare, Grasseli, Ind., to Whiting, Ind.	.15	
8.	Train fare, Whiting, Ind., to Chicago, Ill.	.62	
9.	Train fare, Chicago, Ill., to Detroit, Mich.	9.81	
10.	Train fare, Detroit, Mich., to Toledo, O.		
11.	Train fare, Toledo, O., to Columbus, O.	4.43	
12.	Car fare, Columbus, 2@5c	.10	
13.	Car fare, Cincinnati 6@7c	.42	
14.	Car fare, Chicago 11@6c	.66	
15.	Car fare, Detroit 10@7c	.70	
16.	Car fare, Toledo 8@7c	.56	
17.	Meals, Dayton (one)	.50	
18.	Meals, Cincinnati (four)	2.00	
19.	Meals, Kensington (one)	.50	
20.	Meals, Gary (one)	.50	
21.	Meals, Chicago (four)	2.00	
22.	Meals, Detroit (three)	1.50	
23.	Meals, Toledo (two)	1.00	
24.	Meals, Upper Sandusky (one)	.75	
25.	Pullman, Cincinnati to Kensington	3.00	$3.75
26.	Pullman, Chicago to Detroit	3.00	3.75
27.	Hotel Sinton, Cincinnati, O.	2.00	3.00
28.	Hotel Fort Dearborne, Chicago, Ill.	2.00	3.00
29.	Boody House, Toledo, O.	2.00	2.50
	Total indicated minimum	**$53.88**	
	Possible extras as indicated in Column II	3.50	
	Total indicated maximum	**57.38**	

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